

BAB VIII

PERENCANAAN BASE PLATE K1

8.1 Perhitungan Jumlah Angker Base Plate K1

Output Gaya Maksimum pada Sambungan hasil ETABS

$$M_u := 1243.16 \text{ kgm}$$

$$P_u := 5591.22 \text{ kg}$$

Direncanakan baut HTB $\phi 16$ BJ 41

$$f_{ub} := 4100 \text{ kg/cm}^2$$

$$\Phi_{\text{baut}} := 16 \text{ mm}$$

$$A_b := \frac{\pi}{4} \cdot 1.6^2 = 2.01 \text{ cm}^2$$

Pelat penyambung BJ 37

$$f_u := 3700 \text{ kg/cm}^2 \quad t_p := 12 \text{ mm}$$

$$f_y := 2400 \text{ kg/cm}^2$$

- Kontrol Geser

Direncanakan baut HTB 6 $\phi 16$

$$V_u := \frac{P_u}{6} = 931.87 \text{ kg}$$

$$f_{uv} := \frac{V_u}{A_b} = 463.47 \text{ kg/cm}^2 \quad \blacksquare \leq \blacksquare \quad 0.5 \cdot 0.75 \cdot f_{ub} \cdot 1 = 1537.5 \text{ kg/cm}^2 \quad \text{OK!!}$$

- Beban Tarik (interaksi geser dan tarik)

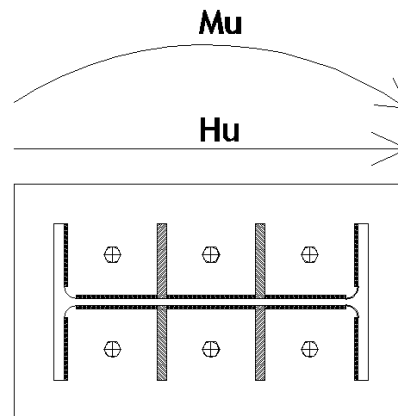
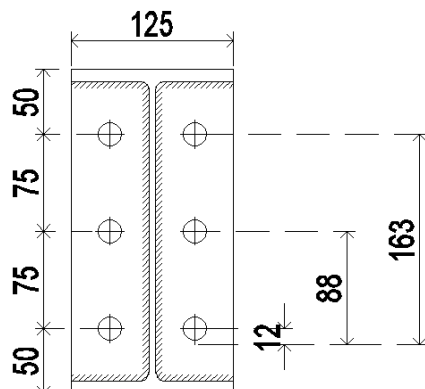
$$f_t := (1.3 \cdot f_{ub} - 1.2 \cdot f_{uv}) = 4773.831 \text{ kg/cm}^2 \quad \blacksquare \geq \blacksquare \quad f_{ub} = 4100 \text{ kg/cm}^2$$

$$f_t := f_{ub} = 4100 \text{ kg/cm}^2$$

$$T_d := 0.75 \cdot f_{ub} \cdot A_b = 6182.654 \text{ kg}$$

Mencari garis netral ----> anggap dibawah baut terbawah

$$a := \frac{6 \cdot T_d}{12.5 \cdot 2400} = 1.24 \text{ cm} \quad \blacksquare \leq \blacksquare \quad 5 \text{ cm} \quad \text{OK!!}$$



Momen rencana yang dapat dipikul sambungan

$$\Phi M_n := \frac{\left[\left(0.9 \cdot 2400 \cdot a^2 \cdot \frac{12.5}{2} \right) + 2 \cdot T_d \cdot (1.2 + 8.8 + 16.3) \right]}{100} = 3458.492 \text{ kgm}$$

$$\Phi M_n = 3458.49 \text{ kgm} \quad \blacksquare \geq \blacksquare \quad M_u = 1243.16 \text{ kgm}$$

8.2 Panjang Angker

$$T_u := \frac{M_u}{4 \cdot (0.012 + 0.088 + 0.163)} = 1181.7 \text{ kg}$$

$$\sigma_b := 250 \text{ kg/cm}^2 \quad (\text{Tegangan beton})$$

$$L_d := \frac{T_u}{0.9\pi \cdot 1.6 \cdot \sqrt{\sigma_b}} = 16.521 \text{ cm} \quad \blacksquare < \blacksquare \quad L_{min} := 30 \cdot \Phi_{baut} \cdot 0.1 = 48 \text{ cm}$$

Pakai panjang angker 50 cm

8.3 Sambungan Pelat dengan Solid Beam (Sambungan Las)

Digunakan las F_{E70XX}

Tebal las $t_e := 1 \text{ cm}$

Profil WF 250 x 125 x 6 x 9 BJ 37

$$h := 250 - 2 \cdot (9 + 12) = 208 \text{ mm}$$

$$A := 2 \cdot (20.8 + 12.5) \cdot 1 = 66.6 \text{ cm}^2$$

$$I_p := 2 \cdot \left[\left(\frac{1}{12} \cdot 20.8 \right)^3 + \left[1 \cdot 66.6 \cdot \left(\frac{25}{2} \right)^2 \right] \right] = 20822.915 \text{ cm}^4$$

Akibat beban geser sentris

$$P_u = 5591.22 \text{ kg}$$

$$f_u := \frac{P_u}{A} = 83.95 \text{ kg/cm}^2$$

Akibat beban momen lentur

$$M_u = 1243.16 \text{ kgm}$$

$$S_x := \frac{I_p}{12.5} = 1665.83 \text{ cm}^3$$

$$f_h := \frac{M_u \cdot 100}{S_x} = 74.63 \frac{\text{kg}}{\text{cm}^2}$$

$$f_{tot} := \sqrt{f_u^2 + f_h^2} = 112.33 \frac{\text{kg}}{\text{cm}^2}$$

Kekuatan rencana las

$$\Phi f_n := (0.75 \cdot 0.6 \cdot 70 \cdot 70.3) = 2214.4 \frac{\text{kg}}{\text{cm}^2}$$

$$f_{total} < \Phi f_n$$

$$t_{perlu} \geq \frac{f_{tot}}{\Phi f_n} = 0.051 \text{ cm}$$

$$a_{perlu} \geq \frac{0.051}{0.707} = 0.072 \text{ cm}$$

Syarat :

$$a_{min} := 5 \text{ mm } (t = 12 \text{ mm})$$

$$a_{effmax} := 0.707 \cdot \frac{3700 \cdot 0.6}{70 \cdot 70.3} = 0.32 \text{ cm } (\text{las di badan})$$

$$a_{effmax} := 1.41 \cdot \frac{3700 \cdot 0.9}{70 \cdot 70.3} = 0.95 \text{ cm } (\text{las di daun})$$

$$\text{maka dipakai } a = 5 \text{ mm} > a_{perlu} = 0.72 \text{ mm}$$

- **Kontrol Pelat Sambung**

Pelat penyambung BJ 37

Direncanakan baut BJ 41

$$f_u := 3700 \text{ kg/cm}^2$$

$$f_{ub} := 4100 \text{ kg/cm}^2$$

$$f_y := 2400 \text{ kg/cm}^2$$

$$d_b := 1.6 \text{ cm}$$

$$t_p := 1.2 \text{ cm}$$

$$A_b := \frac{\pi}{4} \cdot 1.6^2 = 2.01 \text{ cm}^2$$

Luas bidang geser

$$L := 25 \text{ cm}$$

$$A_{nv} := (L - 3 \cdot d_b) \cdot t_p = 24.24 \text{ cm}^2$$

Kuat Rencana

$$\Phi P_n := 0.75 \cdot (0.6 \cdot f_u \cdot A_{nv}) = 40359.6 \text{ kg} \quad \blacksquare > \blacksquare \quad P_u = 5591.22 \text{ kg}$$